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New-Zealand government gazette published them, and a special copy was distributed in the colony and in England. Afterward, geological maps were added, and lectures and maps appeared at Auckland in 1864, under the title of 'The geology of New Zealand.' Later, Hochstetter published in Vienna, 1866, two quarto volumes, entitled 'Geologie und paläontologie von Neu Seeland,' the paleontology being worked up by such specialists as Unger, Zittel, Suess, Stoliczka, with the assistance of Hörnes, von Hauer, and Hochstetter himself. Shortly after his return to Vienna, in 1860, Hochstetter was appointed professor of geology and mineralogy at the imperial polytechnic school. In 1867 he was sent by the Austrian government to Paris as a commissioner to the International exhibition, and in 1874 he was assistant director of the Vienna international exhibition. Shortly after this, he was made director of the new imperial museum of natural history, with the difficult task of erecting a new building. Notwithstanding illness, which soon attacked him, Hochstetter had the happiness of seeing all the collections removed to the new building, and arranged so systematically that the Vienna museum now ranks among the first, if not the first, in the world. From 1869 to 1872, Hochstetter was exploring European Turkey, of which he prepared an ex-

cellent geological map, with a report. He afterwards visited the Ural Mountains, described in his 'Ueber den Ural,' Berlin, 1873. Hochstetter was also a geographer of note, and his 'Die erde' is justly popular. As vice-president, afterward president, of the geographical society of Vienna, he rendered important services to geography, more especially

in assisting the expedition to the north pole, which resulted in the discovery of Franz-Josef Land, and in his continued aid to Dr. Oscar Lenz, the explorer of western Africa, and the traveller who made the remarkable journey from Tangier to Timbuctoo and the Senegal. Finally Hochstetter was selected, in 1872, by the emperor of Austria-Hungary as tutor in natural history to the crown prince.

Personally, Ferdinand von Hochstetter was a most attractive man, a very interesting lecturer, and a powerful conversationalist. He married an

English lady; and his house in Döbling, Vienna, was a centre for Austrian *savants*, and for all foreigners visiting the capital of the Austrian empire.

#### MARRIAGE LAW IN SAVAGERY.<sup>1</sup>

SOCIETY is organized for the regulation of conduct, and conduct is regulated by law in the

<sup>1</sup> See Certain principles of primitive law (*Science*, No. 92).



Ferdinand v. Hochstetter

several stages of human progress in relation to those particulars about which serious disagreement arises. In the early history of mankind it appears, from all that we may now know of the matter, that the most serious and frequent disagreements arose out of the relations of the sexes. Men disagreed about women, and women about men. Early law, therefore, deals to a large extent with the relations of the sexes. The savage legislator sought to avoid controversy by regulating marital relations ; and this he did by denying to the individual the right of choice, and providing that certain groups of men should take their wives from certain groups of women, and, further, that the selection of the woman should not be given to the man, nor the selection of the man to the woman, but that certain officers or elder persons should make the marriage contract. This method of selection will here be called legal appointment.

Now, selection by legal appointment exists among all North-American tribes, and elsewhere among savages in Australia and other portions of the globe : it exists in diverse forms, which may not here be recounted for want of space. But the essential principle is this : in order that controversy may be avoided, marriage selection is by legal appointment, and not by personal choice.

But the second fundamental principle of primitive law greatly modifies selection by legal appointment, and gives rise to three forms of marriage, which will be denominated as follows : first, marriage by elopement ; second, marriage by capture ; third, marriage by duel.

It very often happens in the history of tribes that certain of the kinship groups diminish in number, while others increase. A group of men may greatly increase in number, while the group of women from whom they are obliged to accept their wives diminishes. At the same time another group of women may be large in proportion to the group of men to whom they are destined. Under these circumstances, certain men have a right to many wives, while others have a right to but few. It is very natural that young men and young women should sometimes rebel against the law, and elope with each other. Now, a fundamental principle of early law is that controversy must end ; and such termination is secured by a curious provision found among many, perhaps all, tribes. A day is established, sometimes once a moon, but usually once a year, at which certain classes of offences are forgiven. If, then, a runaway couple can escape to the forest, and live by themselves until the

day of forgiveness, they may return to the tribe, and live in peace. Marriage by this form exists in many of the tribes of North America.

Again : the group of men whose marriage rights are curtailed by diminution of the stock into which they may marry, sometimes unite to capture a wife for one of their number from some other group. It must be distinctly understood that this capture is not from an alien tribe, but always from a group within the same tribe. The attempt at capture is resisted, and a conflict ensues. If the capture is successful, the marriage is thereafter considered legal ; if unsuccessful, a second resort to capture in the particular case is not permitted, for controversy must end. When women are taken in war from alien tribes, they must be adopted into some clan within the capturing tribe, in order that they may become wives of the men of the tribe. When this is done, the captured women become by legal appointment the wives of men in the group having marital rights in the clan which has adopted them.

The third form is marriage by duel. When a young woman comes to marriageable age, it may happen that by legal appointment she is assigned to a man who already has a wife, while there may be some other young man in the tribe who is without a wife, because there is none for him in the group within which he may marry. It is then the right of the latter to challenge to combat the man who is entitled to more than one, and, if successful, he wins the woman ; and by savage law controversy must then end.

All three of these forms are observed among the tribes of North America ; and they are methods by which selection by legal appointment is developed into selection by personal choice. Sometimes these latter forms largely prevail ; and they come to be regulated more and more, until at last they become mere forms, and personal choice prevails.

When personal choice thus prevails, the old regulation that a man may not marry within his own group still exists ; and selection within that group is incest, which is always punished with great severity. The group of persons within which marriage is incest, is always a highly artificial group : hence, in early society, incest laws do not recognize physiologic conditions, but only social conditions.

The above outline will make clear the following statement, that endogamy and exogamy, as originally defined by McLennan, do not exist. Every savage man is exogamous with relation to the class or clan to which he may

belong, and he is to a certain extent endogamous in relation to the tribe to which he belongs, that is, he must marry within that tribe; but in all cases, if his marriage is the result of legal appointment, he is greatly restricted in his marriage rights, and the selection must be made within some limited group. Exogamy and endogamy, as thus defined, are integral parts of the same law, and the tribes of mankind cannot be classed in two great groups, one practising endogamy, and the other, exogamy.

The law of exogamy is universal. Among all peoples there is a group, larger or smaller, and natural or artificial, within which marriage is prohibited. The terms 'exogamy' and 'endogamy' are misleading, and should be discarded.

J. W. POWELL.

#### *A SCIENTIFIC STUDY OF LAWN-TENNIS.*

LAWN-TENNIS is a game which has taken firm hold upon Americans, and is becoming more popular every year. It is claimed to possess the qualities which make a perfect game, being safe, healthful, not insuperably difficult, and alike interesting to 'duffer' and expert, provided the two are not matched. The use of the 'cut' and of slow returns having been given up for drives, volleying, and swift returns, it has ceased to possess the reproach once cast upon it of being a ladies' game, and is admitted to call forth science, skill, and endurance. Lawn-tennis puts upon its players a demand for muscular quickness and elasticity, great self-control, and a fine and peculiar development of the muscular sense.

It is by the help of this sense that the ball is returned with just the right force and in just the right direction, no matter how hard or how gently it strikes the bat; and in tennis the peculiarity lies in the fact that delicate muscular adjustments must be made at the same time that violent contractions of the muscles take place. The skilled artisan goes slowly and gently over his delicate work. The juggler performs his tricks with light and easily handled articles. The billiard-player has to use comparatively little force to make his brilliant strokes. The tennis-player, however, must be ready to strike hard or softly while gripping the racket, adjusting it at just the right angle, and driving it in just the right direction.

Man experiences a curious sensation of pleasure in thus developing and exercising his mus-

cular sense. The delight felt over a good shot, a brilliant catch, an unexpected return,—all come in the main from this same source, which we might almost call the 'sporting sense.'

The physiology of muscular co-ordination has been much studied, but its relation to aesthetics is, perhaps, not as yet 'worked up': therefore I will dwell upon this point a little.

Every phase and degree of muscular contraction registers itself in the brain; but when these contractions, in obedience to the will, effect a certain delicate, previously conceived result, a thrill of pleasure is felt, which is not wholly mental satisfaction over success; it is also an intensified muscular sensation. As the eye delights in beautiful colors, and the ear in sweet music, so the muscles rejoice in delicate adjustments. They have their own aesthetics: hence there have always been athletic sports, and hence even pugilism would have no charm if it were mere slugging.<sup>1</sup> The Greeks cultivated this sense as actively as that for poetry, sculpture, and architecture: we might do well to imitate them.

It is true that the muscular sense is not the only factor in measuring distance and adjusting muscular movements. The eye, the ear, and the tactile, more especially the pressure, sense, also come into play. But setting aside the zest of competition, the joys and sorrows of beating or being beaten, it is to certain sensory nerves, distributed through muscle and tendon, that we must attribute much of the pleasure got from athletic games. This may be shown in still another way. After the frequent repetition of a set of muscular contractions, the sensations excited thereby cease to rise into consciousness. Perhaps this is due, as Ribot suggests, in part to their increased number, and briefness of duration. At any rate, we know that a frequently repeated act of muscular skill finally comes to be done almost automatically and with little intervention of consciousness. So it is that with skilled players the minor and easy strokes of the game call out no new, complex, and delicate adjustments with the corresponding aesthetic excitement.

Every one who has ever attained any special skill in athletic games knows the pain and weariness of playing with the beginner. What hours of heroism in love's cause have been spent by old tennis-players in teaching the non-

<sup>1</sup> I am quite aware that some physiologists consider part of the muscular sensations to be central in origin (innervation feelings), starting up with the volitional impulse, and accompanying it, as it were, to the muscle. It is simply inconceivable, however, that we can be conscious of muscular contractions that have not yet been made.